

Carbon Credit Risk Mitigation of Deforestation: A Study on the Performance of P2H Products and Services in Indonesia

Wiwik Utami¹, Lucky Nugroho^{2*},

Kelum Jayasinghe³

^{1,2} Universitas Mercu Buana, Jakarta, Indonesia,

³ Essex Business School (EBS), University of Essex, UK.

*Correspondence author: lucky.nugroho@mercubuana.ac.id

Abstract

This study aims to analyze the performances of the Indonesian government's P2H products and services that target the prevention and repair of forest damage. The methodology used is a systematic literature review that identifies, assesses, and interprets this chosen research topic's findings. The study attempts to answer three formulated research questions: (i) How to map P2H policies that aligned with the carbon credit risk mitigation of deforestation?; (ii) How to investigate which products of P2H can contribute to the carbon credit risk mitigation?; (iii) How to measure the impact of P2H to prevent deforestation?. The systematic literature review findings highlight that the Indonesian government has adopted some important provisions and institutions, namely P2H products and services, and carried out loan disbursements to prevent forest destruction, i.e., the forestry business and environmental investment financing. The findings also indicate that while the government most extensively disbursed some loans such as community forest enterprises (HR), there was a low level of loan disbursement for community forest-based loans (HKm) because of the constraints faced by farmers in arable land that produce seasonal crops. Therefore, the study implicates that the forest destruction, particularly in Indonesia, resulting from illegal logging by local communities, needs to be further prevented by increasing the public knowledge on sustainability impact of deforestation and also by increasing them assess and opportunities for the public welfare, alternative livelihood, and micro-business activities. The study findings also make an original contribution to the literature on the carbon credit risk mitigation of forest damage, as it illustrated on a government-sponsored innovative P2H scheme, i.e., disbursement of loans, aiming to reduce and prevent forest destruction.

Keywords: Carbon Credit, Risk Mitigation, Deforestation, Legitimacy, P2H products

1. Introduction

Recent climate change has increasingly harmed human life in all countries of the world. Therefore, efforts to prevent environmental damage are the responsibility of all stakeholders in the world (Elkinjton, 1998; Slaper & Hall, 2011). The entire world is currently experiencing the disastrous impact of climate change, i.e., global warming. Therefore, global institutions such as the UN have launched worldwide programs and activities under the Sustainable Development Goals (SDGs) notion to its member countries (Arruda Filho et al., 2019; Scheyvens et al., 2016). The issue of sustainability has now become a common issue for the world community because sustainability expects all stakeholders carry out their

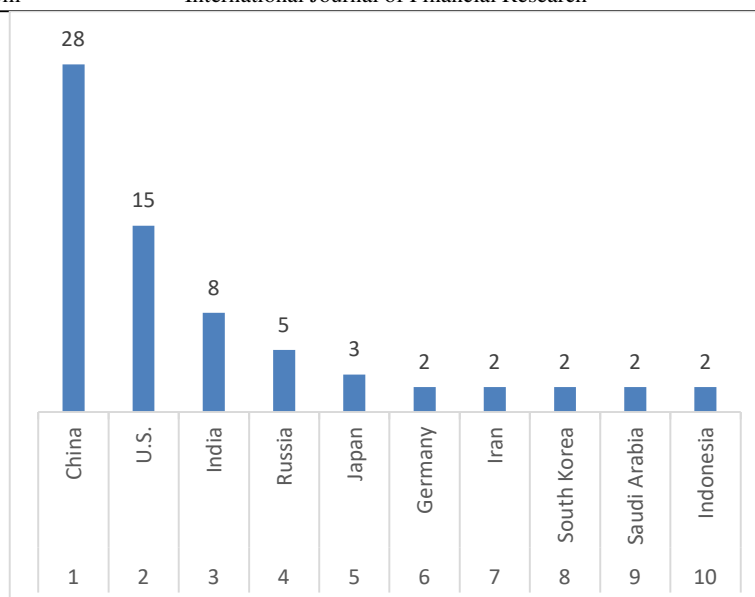
business and other livelihood activities for the long term by balancing economic, social, and environmental interests (Alt et al., 2015; Arafah et al., 2018; Galbreath & Shum, 2012; Nugroho et al., 2017; Wolf, 2014).

Therefore, sustainability focuses on world leaders' focus on improving and preventing environmental damage as a climate change source (Kelman, 2017; Major et al., 2018). Furthermore, the forests are a counterweight to clean air because forests are one of the biosphere ecosystems with relatively dominant plant composition (Meijaard et al., 2013; Sapkota et al., 2005). Automatically, with a structure like this, the forest becomes one of the most dominant ecosystems in consuming CO₂ (carbon dioxide). Thus, the forest has an essential contribution to nature as a CO₂ absorber (Ciais et al., 2013; Goulden et al., 2004; Tupan & Lailossa, 2019). Indonesia as a tropical country has become a global concern, mostly because of its ownership of the ninth-largest forest land in the entire world and its ranking of third for the area of tropical forests after Brazil and Zaire (Barlow & Peres, 2004; Fuller, 2006; Ginoga et al., 2005; Nugroho et al., 2020). Furthermore, according to Alam et al. (2016) and Carlson et al. (2012), Indonesia is a country that recorded as 10th largest in terms of contributing to the environmentally hazardous carbon emission in the world (see Table and Figure 1).

Table 1. Top Ten Polluters Countries

Rank	Countries	2018 carbon dioxide emissions (in billions of tons)	World share (in percent)
1	China	10.06	28
2	America	5.41	15
3	India	2.65	8
4	Russia	1.71	5
5	Japan	1.16	3
6	Germany	0.75	2
7	Iran	0.72	2
8	South Korea	0.65	2
9	Saudi Arabia	0.62	2
10	Indonesia	0.61	2

Source: Alam et al., (2016) and Carlson et al., (2012)



Source: Alam et al., (2016) and Carlson et al., (2012)

Figure 1. Percentage of Carbon Dioxide Contributor Countries

More specifically, Indonesia, together with industrial countries in the world, such as China, America, India, Russia, Japan, Germany, South Korea, and Saudi Arabia, contributes significantly to air pollution. Therefore, world leaders have recognized the need to improve and mitigate environmental damage, especially in Indonesia's forests, referred to as the world's lungs by some scholars (Baransano & Mangimbulude, 2011). For instance, Indonesia is included in 10 countries with the highest tropical rain forest loss in 2018. In that year, Indonesia has lost 339,888 hectares (ha) of primary tropical rain forest land and ranked as the third-worst loss of such land after Brazil (1.35 million ha) and Congo (481,248 ha) (Kusnandar & Widowati, 2019). According to Ardhana (2010) and Majid et al. (2016), the damage to tropical rainforests has been caused by several things, including (i) expansion of mining activities, (ii) forest fires, (iii) conversion of forest land for settlement, agriculture and plantations. These three factors are thus identified as the main drivers of deforestation in the world, including Indonesia.

In this sense, there is widespread pressure on the Indonesian government, as one of the stakeholders legitimately responsible for environmental sustainability, to implement the programs and activities related to ecological conservation improvement and mitigation. For instance, under the Ministry of Environment and Forestry, the Indonesian government has established specialist institutions such as the Forest Development Financing Center (P2H Center) to achieve this purpose. The primary function of the P2H Center is to provide financial/capital support for the forestry businesses and environmental investment to prevent and repair forest damage in Indonesia (Alviya et al., 2020). These forest damage prevention and repair programs aim to improve good air quality and reduce pollution impacts. Following this background, this study conducts a systematical review (Onwuegbuzie & Frels, 2015; Suri et al., 2006) of the government, e.g., P2H Center published documents explaining their programs implemented for the prevention and repairing of forest damage and answers the following formulated research questions: How to mapping P2H policies that aligned with the carbon credit risk mitigation the deforestation?; How to investigate the products of P2H that can contribute to carbon credit risk mitigation?; and How to measure the impact of P2H products to stop deforestation?. By doing so, the study aims to look for the role of government in forest sustainability in the credit carbon perspective, in particular establishing the policies that aligned with the carbon credit risk mitigation of deforestation activities, investigating the products of P2H that can

mitigate the deforestation and measuring the performance of P2H product to the deforestation. This research's novelty is that there has been no prior research related to mitigating the risk of forest damage in terms of the distribution of loans managed by the government, aiming to reduce and prevent forest destruction, particularly in Indonesia.

2. Literature Review

The national economic development programs aim to provide welfare to a country's people and adopt policy instruments to achieve it (Helmsing, 2003; Polozhentseva & Klevtsova, 2015). Such policy documents include guidelines for the implementation and application and contain certain restrictions that ensure the development process can be directed under mutually determined goals (Stupak et al., 2007; Welford et al., 1999). Furthermore, to achieve the development objectives, the policies that have been compiled and made must be implemented and applied correctly (Eaton & Kostka, 2014). Therefore, for the effective implementation of policy, it is necessary to find out and measure the programs that can have a genuine impact or have implications for improving the welfare of the community and analyze the results following the expectations of the compilers and stakeholders who have an interest in the existence of the policy (Eaton & Kostka, 2014; Sovacool, Linnér, & Klein, 2017). On the other hand, the proper application of guidelines in the form of planned and systematic activities, projects, and programs based on norms and provisions to achieve specific goals that have become joint commitments is required for effective policy implementation (L. Nugroho, 2014; Weintraum, 1983).

Furthermore, the policy implementation requires compliance as a condition of success so that its outcomes can be matched with the stakeholders' expectations (Barkemeyer, 2009). Therefore, for the successful implementation of policies, the implementors' legitimacy is also needed (Nivette & Akoensi, 2019). Nivette & Akoensi (2019) states that legitimacy is the power to rule, so that the policy's implementor becomes obedient to the regulatory makers and stakeholders can make the right decisions and follow the policies that have been set. According to Nivette & Akoensi (2019), legislation is necessary to enforce the provisions if there is no compliance from the implementor in implementing the policy. There will be sanctions or fines under the applicable rules. According to Scott (2009) and Skogstad (2003), the party with the primary and ultimate authority to govern implementing policies is the government in power. Therefore, it is argued that the implementation of policies related to forest destruction prevention requires vigorous law enforcement and heavy sanctions by the government at the implementation level.

The current issues concerning increased sustainability, economic growth, and business activities require more emphasis on all stakeholders' social aspects and environmental sustainability than mere profit-orientation (Nilsen, 2019). Therefore, current business growth must be aligned with the long-term objectives of business and society, particularly around the recent circular economy concept. Thus, the circular economy concept aims to maintain the optimal quality of products, outputs, materials, and components in the business process (see Figure 2).



Source: (Nilsen, 2019).

Figure 2. The Crucial Elements in Circular Economy

As demonstrated in Figure 2, the circular economy includes several crucial elements as follows: (i) reduce the use of raw materials and energy, pressure on nature and waste; (ii) reuse, reuse waste that can still be used for the same function or other functions; (iii) recycle materials, reprocessing (recycling) waste into new useful goods or products; (iv) incinerate with heat recovery; and (v) landfill, waste management (eradication) system in an effective manner and does not damage the environment. According to Millward-hopkins & Purnell (2019) and Pieroni, et al. (2019), the definition of a circular economy, which includes, among others, the implementation of the following policies: (i) reuse, repair, and recycling; (ii) a policy of green space and land that is environmentally friendly and supports sustainable innovation; and (iii) policies to increase the market for used goods that can be reused and the use of secondary materials. Therefore, the prevention and the activities related to preventing deforestation and reducing air pollution through reforestation measures taken by the Indonesian government can be classified as circular economy elements.

According to the literature, one contributor to environmental damage is the local level micro and small-scale business sector actors (Nugroho et al., 2017). These actors engage with some business activities that damage the environment, e.g., deforestation, with their economic motivation of fulfilling the basic livelihood needs. These people, including those who live around the forest, have limited knowledge and interest in environmental sustainability. They are more concerned about the survival and prosperity in their economic lives. For instance, Indonesia's forest destruction perpetrators are the people who open agricultural land for their basic economic needs by burning forests (Mustofa, 2011). They cause forest destruction because of their insufficient knowledge and understanding of the importance of forest sustainability (Maryati, 2011). Also, the theft of wood causes damage to the forest. Timber theft in forests in Indonesia is carried out by people living around these forests whose aim is to sell them to wood collectors to meet their basic economic needs (Damayatanti, 2011).

Because of these continuous environmentally damaging activities, the Indonesian government tried to channel finances by establishing microfinance institutions such as cooperatives in village communities living around the forest as an alternative livelihood promotion method and improving their welfare. People get the capital to do alternative businesses away from the forest to fulfill their families' economic needs (Beisland & Mersland, 2012; Hudon, 2013; Postelnicu & Hermes, 2018). Therefore, the previous studies and Indonesia's experience suggest that government intervention is needed to prevent the environmental damage done by communities living around the forest. Extending this knowledge in the literature, the present study attempts to analyze the Indonesian government's policies and measurements aligned with the carbon credit risk mitigation activities of deforestation, particularly the products and services implemented by the P2H Center.

3. Research method

To analyze the Indonesian government's products and services (P2H) to prevent and repair forest damage, the study uses a systematic literature review approach. According to the methodology literature, a systematic literature review identifies, assesses, and interprets all findings on a research topic to answer the formulated research questions (Greene, 2006; Onwuegbuzie & Frels, 2015). Accordingly, the current study address three interrelated research questions identified from the initial literature review and the problematization: (i) how to mapping P2H policies that aligned with the carbon credit risk mitigation the deforestation?; (ii) How to investigate the products of P2H that can contribute to risk mitigation; and (iii) how to measure the impact of P2H products to stop deforestation; The study's meta-analytical framework has involved a three-phase systematic review process, namely (i) exploration, (ii) interpretation, and (iii) communication. Here

the exploration phase was more crucial and included five more steps (Onwuegbuzie and Frels, 2015): (i) exploring beliefs and topics, (ii) initiating the search, (iii) storing and organizing information, (iv) selecting/deselecting information, and (v) expanding the search to include one or more MODES (Media, Observation(s), Documents, Expert(s), Secondary Data). Conceptually, this three-phase (seven-step) model provides a cyclical process. It continues to the exploration phase again, even after the communication phase, depending on the follow-up or further questions identified from the systematic literature review's initial cycle.

Applying the three-phase (seven-step) model (Onwuegbuzie & Frels, 2015), the current study identified two central beliefs and topics: (i) P2H policies and (ii) measurements adopted by the Indonesian government. The study's initial search involved the primary P2H documents published by the P2H Center (e.g. P2H-Center, 2015, 2018). The information in these documents helped the researchers to select and deselect and map the P2H policies and investigate the products of P2H that can contribute to the risk mitigation of deforestation. In the next step, the researchers used the MODES and analyzed the media reports, detailed documents by other agencies (e.g. Hadi, 2017; Leonard, 2019), and expert opinions (e.g. Mando et al., 2020; Safitri, Roessali, & Ekowati, 2019) and all the form of reports contained secondary data that helped to measure the impact of P2H products to stop deforestation (e.g. P2H-Center, 2019a, 2019b, 2019c). The main findings generated from this phase one (five steps approach) of the systematic literature review are interpreted (phase 2) and communicated (phase 3) in the next section.

4. Findings and Discussion

4.1. The Policies Aligned with the Carbon Credit Risk Mitigation of Deforestation

The carbon credit risk mitigation of deforestation in Indonesia is shaped by various regulatory and policy measures set up by the government. For instance, the Ministry of Forestry issued Forestry Minister Regulation Number P.31/Menhut-II/2007 on August 7, 2007. Article 27 states that the Forest Development Financing Center (P2H Center) is the Forest Development Financing Agency, referred to in the Minister of Finance Decree No. 137/KMK.05 / 2007. Furthermore, the Finance Minister appointed the P2H Center as a Government Agency Implementing the Financial Management Pattern for Public Service Bodies in Full based on Decree Number: 105/KMK.05/2010, dated March 9, 2010.

Furthermore, the Forest Development Financing Center (P2H) vision and mission are built concerning: "To become a professional and trusted financial center to support forestry businesses and environmental investment" (P2H-Center, 2020b). Moreover, the mission of the P2H Center is documented as follows: (i) Building a financing network for forestry and environmental investment businesses, especially the forestry, small and medium scale revolving fund facility (FDB); (ii) Realizing excellent service in forestry business financing and environmental investment supported by a reliable organization, professional human resources, adequate infrastructure, and accountable financial management (P2H-Center, 2020b). Based on the Regulation of the Minister of Environment and Forestry Number P.18/MENLHK-II/2015 concerning the Ministry of Environment and Forestry's Organization and Work Procedure, the Main Duties and Functions of the P2H Center are "Implementing financial management as well as channeling and returning revolving funds to finance plantation forest development " (P2H-Center, 2020a). The functions of P2H include (i) Formulation of technical policies, plans, programs, and activities for managing revolving funds to finance plantation forest development and environmental investment; (ii) Implementing technical policies for revolving fund management to finance plantation forest development and environmental investment; (iii) analysis of the feasibility of revolving fund financing, engagement, and risk control for revolving fund financing; and (iv) Implementation of central administrative and household affairs.

The P2H center is managing the revolving funds to finance forestry businesses and environmental investment. Also, the source of funds for forestry business financing comes from the Reforestation Fund, which is placed in the account of the Minister of Finance, the refund of the Debt for Nature Swap (DNS) Program under the Separate Arrangement Agreement to The Amending Agreement dated November 8, 2004, to the Consolidation Agreement of October 2, 2002, concerning Debt Swap III for Nature between the Government of Indonesia and the Government of Germany, and from other legal sources and funds that have been managed by the P2H Center.

Thus, the Indonesian government has a policy through the provisions issued by the Ministry of Environment and Forestry Number P.18/MENLHK-II/2015 Chapter XVIII, appointing P2H as an institution fostered by the Director-General of Sustainable Production Forest Management, Director General of Social Forestry and Environmental Partnership, and the Director-General of Pollution and Environmental Damage Control. The P2H function is to carry out financial management and distribution and return of revolving funds to finance plantation forest development. However, the study's analysis and interpretation of these policies indicate that government regulations should be upgraded to the level of strict laws so that it has more substantial legitimacy and gives the power to government agencies, i.e., P2H Center to maintain the internationally recommended sustainability standards against deforestation (Sanudin et al., 2015). For instance, the position of P2H Center should not be under the ministry but should be a body that has placed at the same level as the ministry. Thus, if P2H Center has become a ministry-level agency, the programs and policies for mitigating forest damage can be executed better and spread its carbon credit risk mitigation activities equally into all the regions of Indonesia. Given the level of forest destruction in Indonesia, it can be argued that such an initiative is quite valuable and alarming.

4.2. The P2H Products Targeting Carbon Credit Risk Mitigation of Deforestation

Type of P2H Central Service is revolving fund facility financing for business actors in forestry and environmental investment (P2H-Center, 2019b). There are two forms of financing offered by the P2H Center; (i) Forestry business financing and (ii) Environmental investment financing. Firstly, in the forestry business financing, the P2H center distributes funds in loan schemes, profit-sharing schemes, and sharia contracts. The distribution pattern can be made through an intermediary agency or without an intermediary institution (direct). Types of forestry businesses that can be financed through this Revolving Fund Facility include:

- Industrial Plantation Forest Business (HTI);
- Community Plantation Forest Business (HTR);
- Community Forest Enterprises (HR);
- Village Forest Enterprises (HD);
- Community Forestry Business (HKm);
- Non-Timber Forest Products (HHBK) utilization businesses;
- Natural forest utilization business with silvicultural enrichment techniques (NFU);
- Ecosystem Restoration (RE).

The forestry business includes forestry businesses that are on-farm and off-farm forestry businesses. The targets for granting the Revolving Fund Facility first include the forestry business actors in the context of RHL activities, consisting of HTI business actors, HTR business actors, HR business actors, HD business actors, HKm business actors, HHBK business actors, Silin actors, and RE actors; and second, the state-owned enterprises that have been assigned or delegated authority to manage state forests (P2H-Center, 2019b).

Secondly, the environmental investment financing of P2H Center is provided in the form of a loan scheme. The distribution is carried out through an intermediary institution with an executing and channeling pattern. Investment criteria that can be financed include waste treatment, 3R (Reduce, Reuse, Recycle), more environmentally friendly replacement, the efficiency of production and natural resources, and emission reduction. Environmental investment financing facilities are provided primarily to micro, small, and medium scale businesses, both individuals and business entities. The benefits for the community and donors in the program are as follows (P2H-Center, 2019a, 2019c, 2019b):

- Increase community income through compensation for environmental funds without having to cut trees and/or damage the environment;
- Compensation funds distributed in the environment are obtained more easily and quickly;
- Community receiving environmental funds can receive assistance from appointing institutions so that the sustainability of the environmental protection program can be maintained;
- Donor countries/institutions can directly interact with P2H as coordinator of environmental fund management in terms of providing grant funds for environmental protection programs;
- Can conduct direct supervision of the distribution of environmental funds through appointing a custodian bank as the trustee.

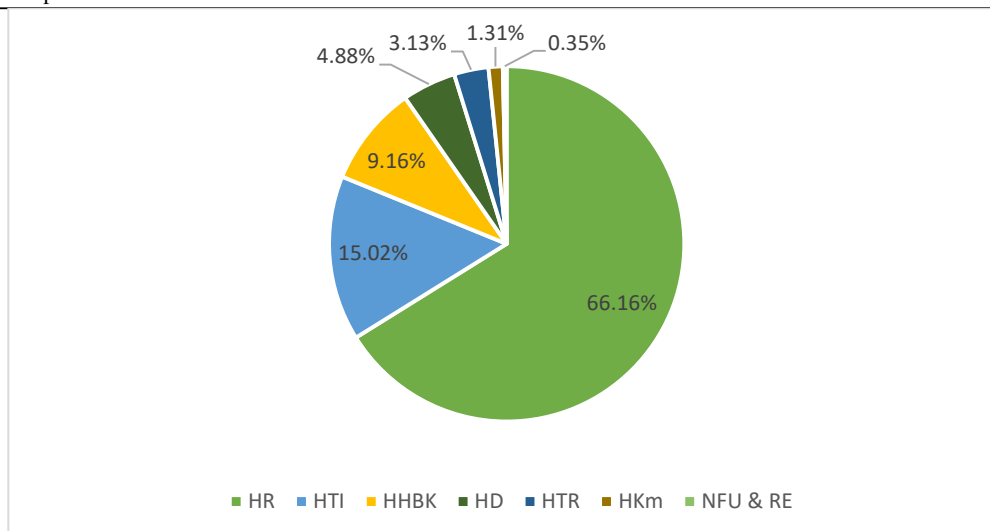
4.3. The Performance of P2H Products and Services

One of this study's objectives is to analyze the usefulness of loan products distributed by the P2H Center. The statistics published by the P2H Center (P2H-Center, 2015, 2018) illustrate the following amounts of distribution for forestry businesses in Indonesia (see Table 2 and Figure 3):

Table 2. Financing Purposes amount Per September 2018

Financing Purposes	Amount (RP)
HR-Community Forest Enterprises	447,839,796,998
HTI-Industrial Plantation Forest Business	101,683,682,622
HHBK Non-Timber Forest Products utilization businesses	61,984,496,200
HD-Village Forest Enterprises	33,028,977,787
HTR-Community Plantation Forest Business	21,189,781,307
HKm-Community Forestry Business	8,847,382,199
NFU & RE-Natural forest utilization business with silvicultural enrichment techniques & Ecosystem Restoration	2,357,850,000
Total	676,931,967,113

(P2H-Center, 2018)



(P2H-Center, 2018)

Figure 3. The portion of Credit Carbon Products

Accordingly, the distribution of community forest financing (HR) occupies the first level of financial or credit products from P2H distributed to the community. The delivery of community forest financing is the provision of loans to forest farmers. Community forest farmers obtain this loan by providing collateral for their trees to the P2H Center. This is a form of appreciation from the government for farmers planting the trees as oxygen producers by providing soft credit called delayed logging (Leonard, 2019). Each farmer who is part of the forestry business unit earns a maximum of IDR 200 million. The borrowing period (HR) is up to crop harvesting or a maximum of 8 years. The loan interest charged to the community forest farmers who receive these loans is established as 6.5 percent per year, representing a lower rate than the people's business credit (KUR) - micro-business credit, subsidized by the government. Loan recipients must use this revolving fund loan specifically for the loan's purpose, namely, productive economic activities. The community forest farmers can also meet their urgent needs, including their daily needs. Suppose the loan customer will harvest plants before the end of the loan period, for example, due to pests. In that case, he/she is obliged to report this to the P2H Center, and that is followed by an obligation to return the loan no later than 30 days after harvesting the plant is carried out. The purpose of the delayed felling loan (HR) is to support efforts to postpone trees' felling to achieve the maturity of cutting to obtain optimal tree economic value. Furthermore, the funds provided can support productive economic activities to help improve the welfare of forest farmers. Several productive businesses can be options for forest farmers utilizing HR loans, including livestock, agricultural business capital, opening a shop or grocery store, party equipment for rental business parties, and rural transportation business (B. Nugroho, 2010).

Industrial plantation forest (HTI) financing that expects to rehabilitate the damaged and no longer productive forest areas is in the second position in the distribution list. The main objective of HTI financing is to support the development of the domestic forest products industry to increase added values and foreign exchange, increase land productivity and environmental quality and expand employment and business fields for the community (Hakim, 2009). Thus, the distribution of HTI financing is aimed at business entities or business actors to obtain capital to increase their capital to run their operations to grow the industrial plants to rehabilitate damaged and no longer productive forests. It can also be interpreted that these businesses' existence can create employment opportunities for the people living in the forest area.

Activity to providing financing to forestry businesses, both on-farm and off-farm, has the principle of supporting the

empowerment of the people's economy, which aims to alleviate poverty, expand employment opportunities, and increase forest productivity to improve environmental quality (Raharjo, 2019). In detail, off-farm forestry businesses that can be financed by P2H Center are the forest product processing businesses such as sawmills and/or wood preservation with a variety of products, including sawn timber. Then wood panels with various products, including veneer, plywood, laminated veneer lumber (LVL), plywood faced bamboo, bare core, blockboard, particleboard, and fiberboard. Another business is wood chips with various products, namely wood chips, and wood-based bioenergy, with various products, including wood pellets, wood charcoal, biofuel, and biogas.

In most documents, community forest (HR) and community plantation forest (HTR) appear to represent the same meaning. Still, HR and HTR have some practical differences in their status, as HR is the forest managed by the community and its status is outside the forest area. In contrast, HTR is in a productive forest area (Donny, 2017) and its credit distribution occupies the fourth position of the credit disbursement list of the P2H Center, aiming to prevent forest damage and undertake forest repairs.

Finally, the community forest-based loans (HKm) from P2H Center offer the credit for preventing forest destruction. It is hoped from this loan scheme that the local community's welfare can be increased through the optimal, fair, and sustainable use of forest resources while maintaining the preservation of forest and environmental functions. However, the previous studies report a low level of loan disbursement for HKm products due to some constraints (Nandini, 2013). As a result, minimal improvements in the communities' welfare around the forest have not. These constraints include the area of arable land that does not match the number of participants. The farming system in this area is still simple and subsistence, and so the ability of community self-help is relatively small. Because of these practicalities, the results are not acceptable and satisfactory from this farming, and these farmers tend to produce only seasonal crops. Ultimately, these farmers cannot obtain the required guarantees, i.e., legal and business certainty for the community forest-based loans (HKm). However, the study's analysis indicates that the government and P2H management still have not paid enough attention to the farmers who generate small added values from their input, post-harvest, and marketing.

5. Conclusion

The study aimed to investigate the policies and products in carbon credit risk mitigation of deforestation in Indonesia. Using a systematic literature review approach (Onwuegbuzie & Frels, 2015; Suri et al., 2006), it attempted to answer the questions of how to map P2H policies that aligned with the carbon credit risk mitigation of deforestation and investigate which products of P2H effectively contributing to the carbon credit risk mitigation of deforestation. The study also investigated the performances of P2H products in terms of preventing deforestation. The overall findings of study indicate and confirm the Indonesian government's crucial regulatory and governing role in preventing forest destruction. The study thus provided a detailed analysis of the Indonesian government's policy initiatives and programs to mitigate the risk of forest destruction and repair forest damage.

Its systematic literature review revealed that the Indonesian government, through its P2H program, has established many carbon credit risk mitigation policies that support forest sustainability at the national and regional levels. The carbon credit risk mitigation agency formed by the government, namely the P2H Center, was found to function in many vital areas of mitigating deforestation risk. Their activities included: (i) Formulation of technical policies, plans, programs, and activities for managing revolving funds to finance plantation forest development and environmental investment; (ii) Implementing technical policies for revolving fund management to finance plantation forest development and environmental investment;

(iii) analysis of the feasibility of revolving fund financing, engagement, and risk control for revolving fund financing; and (iv) Implementation of central administrative and household affairs. In particular, the P2H center was involved in channelling the financing to prevent forest destruction through two main financing business models, namely Forestry Business Financing and Environmental Investment Financing. Out of these two models and related P2H products, the community's most considerable interest was the distribution of community forest financing (HR). It has occupied the first level of financial or credit products from P2H distributed to the community. The delivery of community forest financing was involved with the provision of loans to forest farmers. The community forest farmers were used to obtain this loan by providing collateral for their trees to the P2H Center.

The previous literature on carbon credit risk mitigation of deforestation and sustainability literature reveals the importance of all stakeholders, including the businesses and local community, to conduct their business and other livelihood activities for the long term by finding a balance in their economic, social, and environmental interests (Alt et al., 2015; Arafah et al., 2018; Galbreath & Shum, 2012; L. Nugroho et al., 2017; Wolf, 2014). This study's findings provide a new contribution these literatures, as there has been no prior research related to mitigating the risk of forest damage by employing government initiated P2H products such as distribution of loans, aiming to reduce and prevent forest destruction, particularly in Indonesia's context. Thus, this study analyzed and demonstrated the usefulness as well as the difficulties of implementing P2H products and services to micro businesses and local community engaged with small-scale farming as a carbon risk mitigation of deforestation strategy in emerging economies.

The study also contributes to the carbon credit risk mitigation policy and practice concerning deforestation, as it highlighted a few key areas that require the government's further attention. First, its finding implicates that in order to obtain better results, the government needs to empower and provide more power and authority to the regulated government agencies responsible for risk mitigation of deforestation, such as P2H Center. Then these agencies can implement more innovative and user friendly P2H products and services for their local community stakeholders who engage with the forest damaging business activities. Second, its findings reveal that there was a low level of loan disbursement for the community forest-based loans (Hkm) due to the constraints faced by farmers in the arable land that produces seasonal crops. These farmers thus seem to generate small added values from their input, post-harvest, and marketing. Therefore, special attention and programme is needed from the side of government and P2H Center for these farmers and Hkm products so as to push them away from environmentally damaging economic activities. Overall, the study findings indicate to the policy that the forest destruction, particularly in Indonesia, mainly occurred from the illegal logging by local communities living near forest areas, still needs to be tackled by increasing the public knowledge on the sustainability impacts of deforestation and also by increasing the public welfare, alternative livelihood, and micro-level business activities through improved access to government financing programs.

These findings also stress the need to conduct future studies on this topic, in particular to explore the multiple views of key stakeholders, i.e. P2H officials, community members, and micro-business owners who engage with the carbon credit risk mitigation activities in forest areas. These studies would require qualitative methodological approaches with the support of surveys or interview methods and broader theoretical frameworks, e.g. stakeholder theory to interpretate their findings. Also, there is an opportunity for conducting comparative studies on the topic of carbon credit risk mitigation of deforestation and particularly in cross-country and regional settings. Such studies can illustrate the diverse approaches adopted by various governmental and non-governmental organizations involved with carbon credit risk mitigation of deforestation and create a critical knowledge base for future research and policy development.

References:

- Alam, M. M., Murad, M. W., Noman, A. H. M., & Ozturk, I. (2016). Relationships among carbon emissions, economic growth, energy consumption and population growth: Testing Environmental Kuznets Curve hypothesis for Brazil, China, India and Indonesia. *Ecological Indicators*, 70, 466–479. <https://doi.org/10.1016/j.ecolind.2016.06.043>
- Alt, E., Díez-de-Castro, E. P., & Lloréns-Montes, F. J. (2015). Linking Employee Stakeholders to Environmental Performance: The Role of Proactive Environmental Strategies and Shared Vision. *Journal of Business Ethics*, 128(1), 167–181. <https://doi.org/10.1007/s10551-014-2095-x>
- Alviya, I., Salaka, F. J., Muttakin, M. Z., Nurfatriani, F., & Suryandar, E. Y. (2020). The Effectiveness of Financing Policy for the Developing. *Jurnal Analisis Kebijakan Kehutanan*, 17(1), 53–73. <https://doi.org/10.20886/jakk.2020.17.1>
- Arafah, W., Nugroho, L., Takaya, R., & Soekapdjo, S. (2018). Marketing Strategy for Renewable Energy development In Indonesia Context Today. *International Journal of Energy Economics and Policy*, 8(5), 181–186.
- Ardhana, I. P. G. (2010). Konservasi Keanekaragaman Hayati Pada Kegiatan Pertambangan Di Kawasan Hutan Di Indonesia. *Jurnal Ilmu Pertanian Indonesia*, 15(2), 71–77.
- Arruda Filho, N. de P., Hino, M. C., & Beuter, B. P. (2019). Including SDGs in the education of globally responsible leaders. *International Journal of Sustainability in Higher Education*, 20(5), 856–870. <https://doi.org/10.1108/IJSHE-01-2019-0032>
- Baransano, H. K., & Mangimbulude, J. C. (2011). Eksploitasi dan Konservasi Sumberdaya Hayati Laut dan Pesisir di Indonesia. *Jurnal Biologi Papua*, 3(1), 39–45. <https://doi.org/10.31957/JBP.547>
- Barkemeyer, R. (2009). Beyond compliance – below expectations ? CSR in the context of international development. *Business Ethics: A European Review*, 18(3), 273–289.
- Barlow, J., & Peres, C. A. (2004). Ecological responses to El Niño-induced surface fires in central Brazilian Amazonia: Management implications for flammable tropical forests. *Philosophical Transactions of the Royal Society B: Biological Sciences*, 359(1443), 367–380. <https://doi.org/10.1098/rstb.2003.1423>
- Beisland, L. A., & Mersland, R. (2012). The Use Of Microfinance Services Among Economically Active Disabled People: Evidence From Uganda. *Journal of International Development*, 24(July), 69–83. <https://doi.org/10.1002/jid>
- Carlson, K. M., Curran, L. M., Ratnasari, D., Pittman, A. M., Soares-Filho, B. S., Asner, G. P., ... Rodrigues, H. O. (2012). Committed carbon emissions, deforestation, and community land conversion from oil palm plantation expansion in West Kalimantan, Indonesia. In *Proceedings of the National Academy of Sciences of the United States of America* (Vol. 109, pp. 7559–7564). <https://doi.org/10.1073/pnas.1200452109>
- Ciais, P., Gasser, T., Paris, J. D., Caldeira, K., Raupach, M. R., Canadell, J. G., ... Gitz, V. (2013). Attributing the increase in atmospheric CO₂ to emitters and absorbers. *Nature Climate Change*, 3(10), 926–930. <https://doi.org/10.1038/nclimate1942>
- Damayantanti, P. T. (2011). Upaya Pelestarian Hutan Melalui Pengelolaan Sumber-Daya Hutan Bersama Masyarakat. *Jurnal Komunitas*, 3(1), 70–82.
- Donny, J. (2017). Hutan Rakyat dan Hutan Tanaman Rakyat Tidak Sama. Retrieved August 21, 2020, from

- Eaton, S., & Kostka, G. (2014). Authoritarian environmentalism undermined? local leaders' time horizons and environmental policy implementation in China. *China Quarterly*, 218(1), 359–380. <https://doi.org/10.1017/S0305741014000356>
- Elkinjton, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, 8(1), 37–51.
- Fuller, D. O. (2006). Tropical forest monitoring and remote sensing: A new era of transparency in forest governance? *Singapore Journal of Tropical Geography*, 27(1), 15–29. <https://doi.org/10.1111/j.1467-9493.2006.00237.x>
- Galbreath, J., & Shum, P. (2012). Do customer satisfaction and reputation mediate the CSR-FP link? Evidence from Australia. *Australian Journal of Management*, 37(2), 211–229. <https://doi.org/10.1177/0312896211432941>
- Ginoga, K., Lugina, M., & Djaenudin, D. (2005). Policy Analysis of Protection Forest Management. *Jurnal Penelitian Sosial & Ekonomi*, 2(2), 203–231.
- Goulden, M. L., Miller, S. D., da Rocha, H. R., Menton, M. C., de Freitas, H. C., e Silva Figueira, A. M., & de Sousa, C. A. D. (2004). Diel and seasonal patterns of tropical forest CO₂ exchange. *Ecological Applications*, 14(4), 42–54. <https://doi.org/10.1890/02-6008>
- Hadi, D. W. (2017). KLHK Dukung Rp. 442 Miliar untuk Petani Hutan - Kementerian LHK. Retrieved December 28, 2020, from https://www.menlhk.go.id/site/single_post/261/klhk-dukung-rp-442-miliar-untuk-petani-hutan
- Hakim, I. (2009). The Study of Financing for Industrial Plantation Forest. *Penelitian Sosial Dan Ekonomi Kehutanan*, 6(2), 135–158.
- Helmsing, A. H. J. (2003). Local economic development: New generations of actors, policies and instruments for Africa. *Public Administration and Development*, 23(1), 67–76. <https://doi.org/10.1002/pad.260>
- Hudon, M. (2013). The Ethical Crisis in Microfinance: Issues, Findings, and Implications. *Business Ethics Quarterly*, 23(4), 561–589.
- Kelman, I. (2017). Linking disaster risk reduction, climate change, and the sustainable development goals. *Disaster Prevention and Management*, 26(3), 254–258. <https://doi.org/10.1108/DPM-02-2017-0043>
- Kusnandar, V. B., & Widowati, H. (2019). Inilah Deforestasi di Indonesia Periode 1990-2017 | Databoks. Retrieved August 17, 2020, from <https://databoks.katadata.co.id/datapublish/2019/08/20/inilah-deforestasi-di-indonesia-periode-1990-2017#>
- Leonard, L. (2019). Tunda Waktu Tebang Pohon, KLHK Salurkan Pinjaman untuk Petani Hutan - Ekonomi Bisnis.com. Retrieved August 21, 2020, from <https://ekonomi.bisnis.com/read/20190816/99/1137555/tunda-waktu-tebang-pohon-klhk-salurkan-pinjaman-untuk-petani-hutan>
- Majid, I., Al Muhdar, M. H. I., Rohman, F., & Syamsuri, I. (2016). Konservasi Hutan Mangrove Di Pesisir Pantai Kota Ternate Terintegrasi Dengan Kurikulum Sekolah. *Bioedukasi Universitas Khairun*, 4(2).
- Major, D. C., Lehmann, M., & Fitton, J. (2018). Linking the management of climate change adaptation in small coastal towns and cities to the Sustainable Development Goals. *Ocean and Coastal Management*, 163(December 2017), Published by Sciedu Press

- Mando, L. O. A. S., Kandari, A. M., Kahirun, Rosmarlinasiah, Kasim, S., Midi, L. O., ... Mardhatillah, S. (2020). Level of Management Participation and Financial Analysis of The Community Forest With a Logging Delay System In The South Konawe Regency. *Jurnal Belantara*, 3(2), 128–138.
- Maryati, T. (2011). Preferensi Masyarakat Terhadap Pemilihan Jenis Pohon Dalam Pengelolaan Hutan Berbasis Masyarakat. *Jurnal Hutan Tropis*, 12(31), 123–131.
- Meijaard, E., Abram, N. K., Wells, J. A., Pellier, A. S., Ancrenaz, M., Gaveau, D. L. A., ... Mengersen, K. (2013). People's Perceptions about the Importance of Forests on Borneo. *PLoS ONE*, 8(9). <https://doi.org/10.1371/journal.pone.0073008>
- Millward-hopkins, J., & Purnell, P. (2019). Circulating blame in the circular economy : The case of wood-waste biofuels and coal ash. *Energy Policy*, 129(November 2018), 168–172. <https://doi.org/10.1016/j.enpol.2019.02.019>
- Mustofa, M. S. (2011). Perilaku Masyarakat Desa Hutan Dalam Memanfaatkan Lahan di Bawah Tegakan. *Jurnal Kompetensi*, 3(1), 1–11.
- Nandini, R. (2013). Evaluasi Pengelolaan Hutan Kemasyarakatan (HKm) Pada Hutan Produksi dan Hutan Lindung di Pulau Lombok. *Jurnal Penelitian Hutan Tanaman*, 10(1), 43–55. <https://doi.org/10.20886/jpht.2013.10.1.43-55>
- Nilsen, H. R. (2019). The hierarchy of resource use for a sustainable circular economy. *International Journal of Social Economics*, 47(1), 27–40. <https://doi.org/10.1108/IJSE-02-2019-0103>
- Nivette, A. E., & Akoensi, T. D. (2019). Determinants of satisfaction with police in a developing country: a randomised vignette study. *An International Journal of Research and Policy*, 29(4), 471–487. <https://doi.org/10.1080/10439463.2017.1380643>
- Nugroho, B. (2010). Institutional Development for Community Forest Revolving Fund. *Jurnal Manajemen Hutan Tropika*, XVI(3), 118–125.
- Nugroho, L. (2014). *Central Bank Regulation and Its Impact on Green Microfinance*. Universite Libre de Bruxelles.
- Nugroho, L., Nugraha, E., & Badawi, A. (2020). Sustainable Finance Portfolio Analysis in Islamic Bank (Segment Perspective). *International Journal of Commerce and Finance*, 6(2), 226–240.
- Nugroho, L., Utami, W., Akbar, T., & Arafah, W. (2017). The challenges of microfinance institutions in empowering micro and small entrepreneur to implementating green activity. *International Journal of Energy Economics and Policy*, 7(3).
- Onwuegbuzie, A. J., & Frels, R. K. (2015). Using Q Methodology in the Literature Review Process: A Mixed Research Approach. *Journal of Educational Issues*, 1(2), 90. <https://doi.org/10.5296/jei.v1i2.8396>
- P2H-Center. (2015). *P2H Central Business Strategy Plan*. Jakarta.
- P2H-Center. (2018). *P2H Performance Review 2018*. Jakarta. Retrieved from <http://library1.nida.ac.th/termpaper6/sd/2554/19755.pdf>
- P2H-Center. (2019a). *Flyer about P2H Center*. Jakarta.

P2H-Center. (2019b). *Products of P2H*. Jakarta.

P2H-Center. (2019c). *Skema Bagi Hasil*. Jakarta.

P2H-Center. (2020a). Sejarah - BLU Pusat P2H. Retrieved December 28, 2020, from <https://blup3h.id/sejarah/>

P2H-Center. (2020b). Visi Misi - BLU Pusat P2H. Retrieved December 28, 2020, from <https://blup3h.id/tentang-blu-pusat-p2h/visi-misi/>

Pieroni, M. P. P., Mcaloone, T. C., & Pigosso, D. C. A. (2019). Business model innovation for circular economy and sustainability: A review of approaches. *Journal of Cleaner Production*, 215(January), 198–216. <https://doi.org/10.1016/j.jclepro.2019.01.036>

Polozhentseva, Y., & Klevtsova, M. (2015). Instruments of Development of Cluster Policy: Stages, Models, International Practice. In *Procedia Economics and Finance* (Vol. 27, pp. 529–537). Elsevier B.V. [https://doi.org/10.1016/s2212-5671\(15\)01029-1](https://doi.org/10.1016/s2212-5671(15)01029-1)

Postelnicu, L., & Hermes, N. (2018). Microfinance Performance and Social Capital : A Cross-Country Analysis. *Journal of Business Ethics*, 153(2), 427–445. <https://doi.org/10.1007/s10551-016-3326-0>

Raharjo, A. I. (2019). KLHK Dorong Usaha Kehutanan Off Farm Manfaatkan Fasilitas Dana Bergulir - Nasional JPNN.com. Retrieved August 21, 2020, from <https://www.jpnn.com/news/klhk-dorong-usaha-kehutanan-off-farm-manfaatkan-fasilitas-dana-bergulir>

Safitri, I. D. A., Roessali, W., & Ekowati, T. (2019). Analisis Pendapatan Usaha Penggemukan Sapi Potong Yang Mendapat Dukungan Kredit Tunda Tebang (KTT) Di Kabupaten Semarang. *JSEP (Journal of Social and Agricultural Economics)*, 12(2), 17. <https://doi.org/10.19184/jsep.v12i2.11465>

Sanudin, S., Sadono, R., & Purwanto, R. (2015). Implementation of Community Timber Plantation in Pesisir Barat District-Lampung and Tebo District-Jambi. *Jurnal Manusia Dan Lingkungan*, 22(3), 341–349. Retrieved from <https://journal.ugm.ac.id/JML/article/view/18760>

Sapkota, A., Symons, J. M., Kleissl, J., Wang, L., Parlange, M. B., Ondov, J., ... Buckley, T. J. (2005). Impact of the 2002 Canadian forest fires on particulate matter air quality in Baltimore City. *Environmental Science and Technology*, 39(1), 24–32. <https://doi.org/10.1021/es035311z>

Scheyvens, R., Banks, G., & Hughes, E. (2016). The Private Sector and the SDGs: The Need to Move Beyond ‘Business as Usual.’ *Sustainable Development*, 24(6), 371–382. <https://doi.org/10.1002/sd.1623>

Scott, C. (2009). Governing Without Law or Governing Without Government ? New-ish Governance and the Legitimacy of the EU. *European Law Journal*, 15(2), 160–173.

Skogstad, G. (2003). Who Governs? Who Should Govern?: Political Authority and Legitimacy in Canada in the Twenty-First Century. *Canadian Journal of Political Science*, 36(5), 955–973.

Slaper, T. F., & Hall, T. J. (2011). The Triple Bottom Line : What Is It and How Does It Work ? *Indiana Business Review*, 86(1), 4–8.

Sovacool, B. K., Linnér, B. O., & Klein, R. J. T. (2017). Climate change adaptation and the Least Developed Countries Fund (LDCF): Qualitative insights from policy implementation in the Asia-Pacific. *Climatic Change*, 140(2), 209–
Published by Sciedu Press

- Stupak, I., Asikainen, A., Jonsell, M., Karlton, E., Lunnan, A., Mizaraite, D., ... Tamminen, P. (2007). Sustainable utilisation of forest biomass for energy-Possibilities and problems: Policy, legislation, certification, and recommendations and guidelines in the Nordic, Baltic, and other European countries. *Biomass and Bioenergy*, 31(10), 666–684. <https://doi.org/10.1016/j.biombioe.2007.06.012>
- Suri, R. S., Nesrallah, G. E., Mainra, R., Garg, A. X., Lindsay, R. M., Greene, T., & Daugirdas, J. T. (2006). Daily hemodialysis: a systematic review. *Clinical Journal of the American Society of Nephrology : CJASN*, 1(1), 33–42. <https://doi.org/10.2215/CJN.00340705>
- Tupan, C. I., & Lailossa, G. W. (2019). Potential of stock carbon in mangrove *Sonneratia alba* in Passo coastal waters, Inner Ambon Bay. In *IOP Conference Series: Earth and Environmental Science* (Vol. 339, pp. 1–7). <https://doi.org/10.1088/1755-1315/339/1/012009>
- Weintraum, B. (1983). Freezing the Debtor ' s Account : A Banker ' s Dilemma Under the Bankruptcy Code. *Banking LJ*, 100.
- Welford, R., Ytterhus, B., & Eligh, J. (1999). Tourism and sustainable development: An analysis of policy and guidelines for managing provision and consumption. *Sustainable Development*, 7(4), 165–177. [https://doi.org/10.1002/\(SICI\)1099-1719\(199911\)7:4<165::AID-SD117>3.0.CO;2-F](https://doi.org/10.1002/(SICI)1099-1719(199911)7:4<165::AID-SD117>3.0.CO;2-F)
- Wolf, J. (2014). The Relationship Between Sustainable Supply Chain Management, Stakeholder Pressure and Corporate Sustainability Performance. *Journal of Business Ethics*, 119(3), 317–328. <https://doi.org/10.1007/s10551-012-1603-0>

